CLAIMS

What I claim is:

1. An isolated and purified nucleic acid molecule comprising a nucleic acid sequence which encodes a polypeptide selected from any one of:

   (a) SEQ ID No: 2;

   (b) SEQ ID No: 4;

   (c) SEQ ID No: 6;

   (d) SEQ ID No: 8;

   (e) an immunogenic fragment comprising at least 12 consecutive amino acids from a polypeptide of (a) to (d); and

   (f) a polypeptide of (a), (b), (c) or (d) which has been modified by conservative amino acid substitution without loss of immunogenicity, wherein said modified polypeptide is at least 75% identical in amino acid sequence to the corresponding polypeptide of (a), (b), (c) or (d).

2. A isolated and purified nucleic acid molecule comprising a nucleic acid sequence selected from any one of:

   (a) SEQ ID No: 1;

   (b) SEQ ID No: 3;

   (c) SEQ ID No: 5;

   (d) SEQ ID No: 7;

   (e) a sequence comprising at least 38 consecutive nucleotides from any one of the nucleic acid sequences of (a) to (d); and

   (f) a sequence which encodes a polypeptide which has been modified by conservative amino acid substitution without loss of immunogenicity and which is at least 75% identical in amino acid sequence to the polypeptides encoded by SEQ ID No:1, 3, 5, or 7.

3. A isolated and purified nucleic acid molecule comprising a nucleic acid sequence which is complementary to any one of the nucleic acid molecule of claim 1.

4. A nucleic acid molecule comprising a nucleic acid sequence which encodes a fusion protein, said fusion protein comprising a polypeptide encoded by a nucleic acid molecule according to claim 1 and an additional polypeptide.

5. The nucleic acid molecule of claim 4 wherein the additional polypeptide is a heterologous signal peptide.

6. The nucleic acid molecule of claim 4 wherein the additional polypeptide has adjuvant activity.

7. A nucleic acid molecule according to any one of claims 1 to 6, operatively linked to one or more expression control sequences.

8. A vaccine comprising a vector comprising a nucleic acid molecule which encodes a polypeptide selected from any one of:

   (a) SEQ ID No: 2;

   (b) SEQ ID No. 4;

   (c) SEQ ID No: 6;

   (d) SEQ ID No: 8;

   (e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of any one of (a) to (d); and

   (f) a polypeptide of any one of (a) to (e) which has been modified by conservative amino acid substitution; wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (e); wherein the nucleic acid molecule is either operatively linked to one or more control sequences for expression of the polypeptide in a mammalian or a bacterial cell; wherein the vaccine provides an immune response protective against disease caused by Chalmydia.

9. The vaccine of claim 8 wherein the vaccine optionally comprises an additional nucleic acid encoding an additional polypeptide which enhances the immune response to the polypeptide selected from any one of (a) to (f).

10. A pharmaceutical composition comprising a pharmaceutically acceptable carrier or diluent suitable for use in a vaccine and a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8;

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d); and

(f) a polypeptide of any one of (a) to (e) which has been modified by conservative amino acid substitution without loss of immunogenicity; wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (e); wherein the nucleic acid molecule is operatively linked to one or more control sequences for expression of the polypeptide in a mammalian cell.

11. The pharmaceutical composition of claim 10 comprising a pharmaceutically acceptable carrier or diluent suitable for use in a vaccine and a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8; and

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d).

12. The pharmaceutical composition of claim 10 comprising a pharmaceutically acceptable carrier or diluent suitable for use in a vaccine and a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8; and

(e) a polypeptide of any one of (a) to (d) which has been modified by conservative amino acid substitution without loss of immunogenicity, wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) or (d).

13. The vaccine of claim 8 comprising a vaccine vector wherein the vaccine vector comprises a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6; and

(d) SEQ ID No: 8.

14. The vaccine of claim 8 comprising a vaccine vector wherein the vaccine vector comprises a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8; and

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d).

15. The vaccine of claim 8 comprising a vaccine vector wherein the vaccine vector comprises a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8; and

(e) a polypeptide of any one of (a) to (d) which has been modified by conservative amino acid substitution without loss of immunogenicity, wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (d).

16. A method for preventing or treating Chlamydia infection comprising the step of administering an effective amount of a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No: 4;

(c) SEQ ID No: 6;

(d) SEQ ID No. 8;

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d); and

(f) a polypeptide of any one of (a) to (e) which has been modified by conservative amino acid substitution without loss of immunogenicity, wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (e); wherein the nucleic acid molecule is operatively linked to one or more control sequences for expression of the polypeptide.

17. The method of claim 17 for preventing or treating Chlamydia infection, comprising the step of administering an effective amount of a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No: 4;

(c) SEQ ID No: 6; and

(d) SEQ ID No. 8.

18. The method of claim 17 for preventing or treating Chlamydia infection, comprising the step of administering an effective amount of a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No: 4;

(c) SEQ ID No: 6;

(d) SEQ ID No. 8; and

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d).

19. The method of claim 17 for preventing or treating Chlamydia infection, comprising the step of administering an effective amount of a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No: 4;

(c) SEQ ID No: 6;

(d) SEQ ID No. 8; and

(e) a polypeptide of any one of (a) to (d) which has been modified by conservative amino acid substitution, wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) or (d).

20. A unicellular host transformed with the nucleic acid molecule of claim 7.

21. A nucleic acid probe of 5 to 100 nucleotides which hybridizes under stringent conditions to the nucleic acid molecule of SEQ ID No: 1, 3, 5 or 7, or to a homolog or complementary oranti-sense sequence of said nucleic acid molecule.

22. A primer of 10 to 40 nucleotides which hybridizes under stringent conditions to the nucleic acid molecules of SEQID No: 1 or 3, or to a homolog or complementary or anti-sensesequence of said nucleic acid molecule.

23. A polypeptide encoded by a nucleic acid sequence according to any one of claims 1, 2 and 4 to 7.

24. A method for producing a polypeptide of claim 7 comprising the step of culturing a unicellular host according to claim 21.

25. An antibody against the polypeptide of any one of claims 24.

26. A vaccine comprising at least one first polypeptide according to any one of claims 1, 4, to 7 and a pharmaceutically acceptable carrier, optionally comprising a second polypeptide which enhances the immune response to the first polypeptide.

27. The vaccine of claim 27 wherein the second polypeptide comprises an additional Chlamydia polypeptide.

28. A pharmaceutical composition comprising a polypeptide according to any one of claims 1, 4 to 7 and a pharmaceutically acceptable carrier.

29. A pharmaceutical composition comprising a vaccine according to claim 27 or 28 and a pharmaceutically acceptable carrier.

30. An isolated polynucleotide from a strain of *Chlamydia* selected from the group consisting of:

(a) a polynucleotide comprising the nucleotide sequence of SEQ ID NO:1;

(b) a polynucleotide comprising the nucleotide sequence of SEQ ID NO:3;

(c) a polynucleotide comprising the nucleotide sequence of SEQ ID NO:5;

(d) a polynucleotide comprising the nucleotide sequence of SEQ ID NO:7;

(e) a polynucleotide that is at least 95% homologous to the nucleotide sequence of SEQ ID NO:1, 3, 5, or 7; and

(f) a polynucleotide which hybridizes under stringent hybridizing conditions of 6xSSC containing 50% formamide at 42°C with a polynucleotide comprising the nucleotide sequence of SEQ ID NO:1, 3, 5, or 7;

wherein administration of said isolated polynucleotide, in an immunogenically-effective amount to a mammal, induces an immune response in said mammal against infection by said strain of *Chlamydia*.

31. An isolated and purified polypeptide molecule comprising a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No: 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8;

(e) an immunogenic fragment comprising at least 12 consecutive amino acids from a polypeptide of (a) to (d); and

(f) a polypeptide of (a), (b), (c) or (d) which has been modified by conservative amino acid substitution without loss of immunogenicity;

wherein said modified polypeptide is at least 75% identical in amino acid sequence to the corresponding polypeptide of (a), (b), (c) or (d).

32. A polypeptide molecule of claim 31 further comprising a heterologous signal peptide.

33. A vaccine comprising a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8;

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of any one of (a) to (d); and

(f) a polypeptide of any one of (a) to (e) which has been modified by conservative amino acid substitution, wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (e); wherein the nucleic acid molecule is either operatively

linked to one or more control sequences for expression of the polypeptide in a mammalian or a bacterial cell, wherein the vaccine provides an immune response protective against disease caused by Chalmydia

34. A pharmaceutical composition comprising a pharmaceutically acceptable carrier or diluent suitable for use in a vaccine and a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8;

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d); and

(f) a polypeptide of any one of (a) to (e) which has been modified by conservative amino acid substitution without loss of immunogenicity;

wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (e).

35. The vaccine of claim 33 futher comprising an adjuvant.

36. The vaccine of claim 35 wherein said adjuvant is an ISCOM adjuvant.

37. The pharmaceutical composition of claim 34 comprising a pharmaceutically acceptable carrier or diluent suitable for use in a vaccine and a nucleic acid molecule which encodes a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No. 4;

(c) SEQ ID No: 6;

(d) SEQ ID No: 8; and

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d).

38. A method for preventing or treating Chlamydia infection comprising the step of administering an effective amount of a polypeptide selected from any one of:

(a) SEQ ID No: 2;

(b) SEQ ID No: 4;

(c) SEQ ID No: 6;

(d) SEQ ID No. 8;

(e) an immunogenic fragment comprising at least 100 consecutive amino acids from the polypeptide of (a) to (d); and

(f) a polypeptide of any one of (a) to (e) which has been modified by conservative amino acid substitution without loss of immunogenicity; wherein said modified polypeptide is at least 90% identical in amino acid sequence to the corresponding polypeptide of any one of (a) to (e).